

PATENT COOPERATION TREATY

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year)

04.02.2005

Applicant's or agent's file reference
K2365-PCT

IMPORTANT NOTIFICATION

International application No.
PCT/BE 03/00198

International filing date (day/month/year)
14.11.2003

Priority date (day/month/year)
14.11.2002

Applicant
K.U.LEUVEN RESEARCH & DEVELOPMENT et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference K2365-PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/BE 03/00198	International filing date (<i>day/month/year</i>) 14.11.2003	Priority date (<i>day/month/year</i>) 14.11.2002
International Patent Classification (IPC) or both national classification and IPC B01F3/08		
Applicant K.U.LEUVEN RESEARCH & DEVELOPMENT et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

I ☒ Basis of the opinion

II ☐ Priority

III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

IV ☐ Lack of unity of invention

V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

VI ☐ Certain documents cited

VII ☐ Certain defects in the international application

VIII ☐ Certain observations on the international application

Date of submission of the demand 18.05.2004	Date of completion of this report 04.02.2005
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div>	Authorized Officer Muller, G Telephone No. +49 89 2399-2331



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**
JC20 Rec'd PCT/PTO 12 MAY 2005

International application No. PCT/BE 03/00198

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-24 as originally filed

Claims, Numbers

1-25 received on 21.12.2004 with letter of 16.12.2004

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/BE 03/00198**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-25
	No: Claims	
Inventive step (IS)	Yes: Claims	1-25
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-25
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following document:

D1: GB-A-1055436

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):
an emulsifying method wherein a premix of two or more immiscible liquids is stirred and circulated through a magnetic field.

The subject-matter of claim 1 differs from this known method in that the linear flow rate of said liquids through the magnetic field is between 0.25 and 25m/s.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a process for making emulsions, which avoids the requirements of complex mechanical equipment, while resulting in a desirable droplet size, and having a good storage stability.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

D1 does not suggest, and even teaches away from a linear flow for the substance to be emulsified. The linear flow allows the magnetic treatment to effectively perform droplet or micelle formation to a significant extend, in a short time.

Claims 2-25 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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16 December 2004

JC20 Rec'd PCT/PTO 12 MAY 2005

CLAIMS

1. An emulsification method comprising flowing, conducting or circulating a pre-mix of two or more immiscible liquids through one or more magnetic fields under conditions to emulsify said pre-mix, wherein said pre-mix of two or more immiscible liquids is milk or comprises at least a hydrophilic liquid and at least a lipophilic liquid, wherein said lipophilic liquid is selected from the group consisting of edible oils, fats, fatty acids and esters thereof formed from a saturated or unsaturated linear or branched aliphatic alcohol having from 1 to 18 carbon atoms or from a saturated or unsaturated linear or branched aliphatic polyol having from 2 to 6 carbon atoms or from a polyethyleneglycol or polypropyleneglycol or methoxy polyethyleneglycol having a molecular weight up to 1,500; natural or synthetic, saturated, mono-unsaturated or polyunsaturated acids having from 8 to 24 carbon atoms and optionally one or more functional groups such as hydroxy or epoxy; lipids including mono- and polyacylglycerols, phosphoglycerides, sphingolipids, amino-amidines, and mixtures thereof, and wherein the linear flow rate of said liquids through each said magnetic field is between 0.25 and 25 m/s.
2. An emulsification method according to claim 1, wherein said hydrophilic liquid is an aqueous or nearly-aqueous phase.
3. An emulsification method according to claim 1 or claim 2, wherein said pre-mix further comprises one or more viscosity regulators and / or one or more emulsifiers or emulsion stabilizers or surfactants.
4. An emulsification method according to any of claim 1 to 3, wherein said method is carried out continuously or intermittently.
5. An emulsification method according to any of claims 1 to 4, wherein said pre-mix further comprises solid particles suspended therein.
6. An emulsification method according to any of claims 1 to 5, wherein the strength of each said magnetic field is at least about 2,000 gauss.

Bird Goën & 26
2

16 December 2004

7. An emulsification method according to claim 2, wherein the proportion of said lipophilic liquid in said pre-mix is within a range from 3 to 60% by weight .
8. An emulsification method according to any of claims 1 to 7 , wherein said
5 pre-mix of two or more immiscible liquids is re-circulated from 10 to 10,000 times through each said magnetic field .
9. An emulsification method according to any of claims 1 to 8 , wherein the
10 linear flow rate of said liquids through each said magnetic field is between 0.6 and 5 m/s.
10. A method according to any of claims 1 to 9 , wherein the residence time of said fluid through each said magnetic field is between 60 microseconds and 10 seconds.
- 15 11. An emulsification method according to any of claims 1 to 10, wherein flowing said liquids through said magnetic field(s) is effected at a temperature between 10°C and 90°C.
- 20 12. An industrial process including an emulsification method according to any of claims 1 to 10 as a process step.
13. An industrial process according to claim 12, wherein said process further comprises one or more post-processing steps performed following the
25 emulsification step.
14. An industrial process according to claim 13 , wherein said post-processing step is a heating step.
- 30 15. An industrial process according to claim 13 , wherein said post-processing step is a cooling step.
16. An industrial process according to claim 13 , wherein said post-processing

step is a drying step for at least partially removing the hydrophilic liquid present in the emulsification step.

5 17. An industrial process according to claim 13 , wherein said post-processing step is a freeze-drying step.

10 18. An industrial process according to claim 13 , wherein said post-processing step is a step of diluting the emulsion through the addition of a liquid into said emulsion.

19. An industrial process according to any of claims 12 to 18 , wherein said process further comprises one or more steps of controlling the size of droplets or micelles produced during the emulsification step.

15 20. An industrial process according to claim 19 , wherein said size controlling step is performed by dynamic light scattering analysis.

20 21. An industrial process according to claim 20, wherein said process comprises a post-processing step performed following the emulsification step and further comprising one or more steps of controlling the size of emulsion droplets or micelles during or after said post-processing step.

25 22. An industrial process according to claim 21 , wherein said size controlling step after said post-processing step is performed by dynamic light scattering analysis.

30 23. An industrial process according to any of claims 19 to 22 , wherein said size controlling step is performed in such a way as to measure the average size and/or the size distribution.

24. An industrial process according to claim 13 , wherein said post-processing step is a sonication step.

Bird Goën & 28
4

16 December 2004

25. An emulsification method according to any of claims 1 to 11 , wherein said pre-mix of two or more immiscible liquids is milk, whereby the average size of the smallest micelles or particles contained in milk is decreased by at least 50 %.

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